The

Monthly Evening Sky Map

A JOURNAL FOR THE AMATEUR — FOUNDED BY THE LATE LEON BARRITT
—NORTHERN AND SOUTHERN HEMISPHERE—

ALSO A STAR, CONSTELLATION AND PLANET FINDER MAP ARRANGED FOR THE CURRENT MONTHS — JULY-AUG.-SEPT. MORNING AND EVENING — AND PRACTICAL ANYWHERE IN THE WORLD

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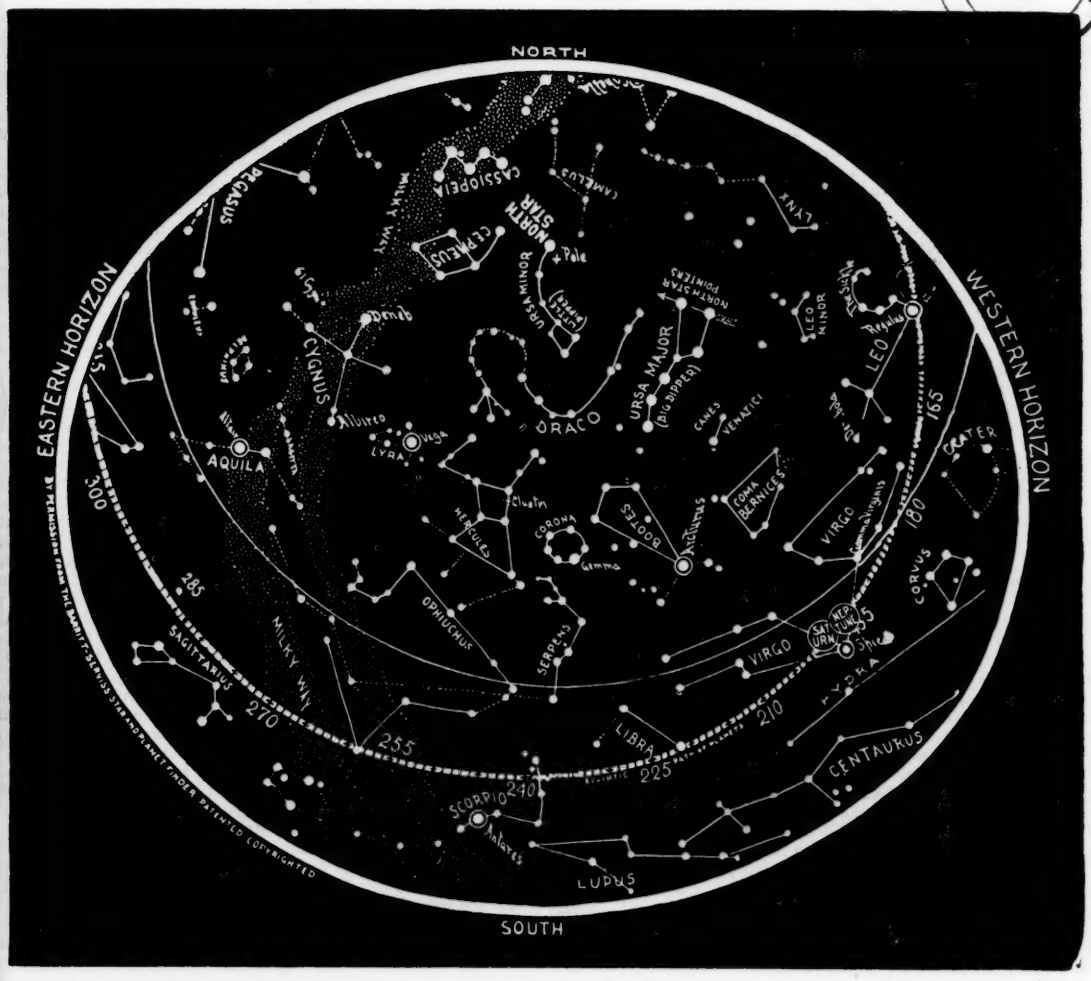
EVENING SKY MAP FOR JULY



Face South And Hold The Map Overhead. The Top North And You Will See The Stars And Planets Just As They Appear In The Heavens. The Arrow Through The Two Stars In The Bowl Of The Big Dipper Points To The North Star. The Star At The End Of The Little Dipper.

AT 9:00 P. M., JULY 1; 8:00 P. M., JULY 15; 6:30 P. M., JULY 31.

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

The Constellations & How to Find Them

From the very earliest ages the stars have been watched with interest and admiration, and their movements traced out and applied to various useful purposes. Their influences, too, on the fortunes and destinies of man, were made the subject of ignorant and superstitious inquiry, as it was believed in the early times that the "stars in their courses" rules the fate of men and nations. Nor can it be wondered at, that long before the motions of the heavenly bodies were accurately known, men would look up to the starry heavens in wonder and reverence, watching with superstitious awe those innumerable orbs. They would naturally believe that by a knowledge of the stars and their movements, they would be able to foretell future events with great exactness, and to think that the ever-varying aspects of the heavens, in their regular progression, and solemn and steadfast silence, would if studied, reveal to them the secret of their future destinies. But even at the present time, when science and religion have so enlightened the world, there are those who, though they do not believe in the influence of the stars, or astrology, believe in planetology, or in the power that planets and comets are supposed to have over famines, pestilences, droughts, earthquakes and such like.

To any one who has an interest in the study of the starry heavens, there is no occupation more agreeable than to observe the sky on a clear night, and watch the varied positions of the constellations from season to season noting as the months advance, familiar stars disappearing in the west as new groups appear in the east, till after the lapse of a year the heavens will again represent the same appearances.

It was evidently for the purpose of identifying the stars and finding out more about them that the first watchers of the sky divided the heavens into groups, or constellations, naturally naming each group after some object to which they fancied it had a resemblance. As these first observers of the heavens were chiefly shepherds or herdsmen, we can readily conceive how the oldest constellations are generally called after objects and animals with which a herdsman would be familiar in those early times. They would picture to themselves in the different star groups the objects with which they would be best acquainted; and thus it is that we see scattered all over the heavens groups of stars representing bears, lions, sheep and oxen; and even the herdsman and huntsman himself.

It was undoubtedly from the Chaldaeans and Egyptians that we derived this system of naming and recognizing the constellations, although the Arabians, Persians, Greeks and others have added many constellations of their own; and even in modern times a great many new names have, from time to time, been given to small groups of stars, which have not always been accepted by uranographers. The idea of the constellation figures is evidently very old, for there are few ancient authors in which some of them, at least are not to be found. Bootes and the Bear are mentioned both by Homer and Hesiod; and Job—who is supposed to have been an Arabian chief prior to the time of Moses—speaks about Arcturus, Orion and the Pleiades, so that a great many of the constellations with which we are familiar at the present day were known to the people who lived in those early ages. It is probably more than 4,000 years ago since the oldest star groups were first named, and by a people as it is thought by some astronomers—who lived in a country at no great distance from Mount Ararat. At that time—when the present names of the constellations were first invented—the heavens did not present the same appearance as they do at the present day; for we know that the earth besides rotating on its axis and revolving round the sun, reels like a mighty gyroscope, but with so slow a motion that it takes nearly 25,900 years to make one complete revolution of its axis round an imaginary line perpendicular to the plane in which the earth moves. Still further, as this axis of the earth moves in its circuit round this perpendicular line, it points successively to different parts of the heavens, and as this point in the heavens to which the axis is directed (called the celestial pole) will not have any diurnal motion, all the stars will appear to revolve round it, or round the star that may be nearest to it; from which circumstance it will be called the pole star. Thus 4000 years ago, the earth's axis pointed in a direction different from what it does at present, and therefore the same constellations at that time would appear in a different part of the heavens. The axis or pole was then pointing to a star in the constellation of Draco. Called Thuban, which was the 'Pole Star' at the time when the star-groups are supposed to have been first named. It was also the Pole Star to the Egyptians at the time when the great Pyramid of Cheops was built and no doubt it would be of great use in building that structure; which is found to be very accurately placed with regard to the four cardinal points.

The Pole star at that time would shine down the long slanted tunnel in the side of the Pyramid, and would probably be seen shining in the day time as well as at night.

In passing, as it may be of some interest to the reader, we may mention that there are those who believe that when ancient writers speak about the "Old Dragon" being cast out of heaven and "his tail drawing the third part of the stars of heaven," that reference was made, perhaps unconsciously, to an old tradition of Draco falling away from his prominent position among the constellations, which, by the gyratory motion of the earth, he has really done, taking the surrounding stars with him. The above persons also see in a whole series of constellations near each other the story of the deluge in the ship Argo they see the ark; in Aquarius, the water-bearer (which represents a man pouring water out of a vessel); and in the river Eridanus, the flood is represented, with Pisces, the fishes, and Cetus, the whale, swimming in the "deep waters." They also see in Corvus and in Columba, the raven and the dove that Noah sent out of the ark. Again in Centaurus—which originally represented a man offering a sacrifice—Noah is perceived offering a sacrifice after leaving the ark; and in the bow of Sagittarius, the bow of promise, set in the clouds above the altar, which is represented in the constellation of Ara.

The above plan of the ancients in connecting with the different star-groups, names suggestive of the great events of the early history of the world, seems easily accounted for, when we remember the fact that the constellations were likely named (perhaps a few centuries) after the deluge, when men's minds were still, from traditionary tales, full of the terrible visitations which the earth had witnessed, and so would easily suppose that they saw in the heavens, outlined by stars, the whole narrative of Noah's flood.

Those who thus found a picture of the deluge in these constellations, also found in Hercules, defeated by the serpent, the first Adam; and in Ophiuchus, the serpent bearer, the type of the second Adam triumphant over the serpent; and in Orion, the noblest of all the constellations, Nimrod, "the mighty hunter," with his two dogs, Canis Major and Canis Minor, and the animals he hunted, such as Lepus, the hare.

Nearly all the constellations, as they are at present depicted have no resemblance whatever to the objects which gave rise to their names, but this can, in many instances be easily accounted for. The motion of the earth's axis round the Pole of the ecliptic, as already described, would greatly alter the positions of the stars, with regard to the diurnal motion of the heavens, which would much affect the general appearance of the constellations as compared with their appearance at present. In the case of Argo, for instance, which at present is never seen on a horizontal keel, as one would naturally suppose a ship should always be seen, but about 4,000 years ago, in the latitude of Chaldaea, or Egypt, it would be seen just above the southern horizon, sailing horizontally so that this constellation is owing to the gyratory motion of the earth, never seen by us in the same manner as it was seen at the time when it was first named. Again, as the representations of the constellations have been handed down to us, they have in a great many instances, been robbed of some of their principal stars, which have gone to form new constellations, and in other cases, stars have been added to constellations, which belonged to other asterisms; so that now we do not, for certain, know what actually were all the stars belonging to the old constellations.

The difference between the ancient and modern appearance of the constellations may still further be accounted for on the supposition that the astronomers (rather astrologers) who divided the heavens into groups, would not require that the stars of a constellation should belong exclusively to it, but would look upon a great many of the stars as common to several constellations. When, however, the exact position of a star in the heavens was required (which may have been the case as far back as the time of Hipparchus), each constellation would require to have boundaries assigned in order to know what stars really belonged to it; thus, any star that before common to many groups, would no longer require to be so, but would, henceforth, be exclusively fixed to one constellation. This will account in some manner for the lost stars of some of the constellations, without which the group would never have derived its present name. There are instances of this in various parts of the heavens—in Hercules the star Iota would, in all probability, belong to Draco, when that constellation was named. The same occurs in Coma Bernices (a small group of stars near the tail of Leo which was named by Tycho Brahe in 1604) which at one time would likely form the tuft of hair in the tail of the Lion, and in the modern constellation of Crux (which is only seen in the southern hemisphere), it was thought by Mr. Proctor that it originally belonged to Centaurus.

The above suppositions may account for the fact that so many constellations now have not the least resemblance to the objects that they are supposed to represent, and may likewise explain how the original constellations would, when first imagined, have some likeness to the objects from which they were named. Ursa Major, the Great Bear, for instance, must originally have had a striking resemblance to a bear, for it was recognised quite independently by many nations besides the ancient Greeks. Draco still has some likeness to a dragon, and there are other constellations besides these, which have at present a resemblance to the object from which they derived their names—such as the Northern Crown, Dolphinus, Scorpio, &c.

It was probobly from the Chaldeans that the Egyptians derived their knowledge of the constellations, for the architects of the

Great Pyramid are thought to have been of that race, and they have shown us by the records they have left in that huge structure that they were as far advanced in astronomy and mathematics as could be expected in those very early ages. Indeed, it is highly probable that the Chaldeans at the time the Pyramid was built, possessed a far more accurate knowledge of astronomy than the Greeks did 2,000 years afterwards.

The Egyptians would likely communicate the knowledge of the old constellations, and astronomy, as it was then known, to the surrounding nations—to the Arabians, Persians, and to the ancient Greeks, &c.—each nation adding some constellations of its own. The Arabians gave individual names to the brightest stars; generally naming the star from the position it occupied in the constellation; as, for instance, Betelgeux from Ibt-al-Jauza, the giant's shoulder—that star being on the shoulder of the "Giant Orion."

The ancients used to stars for many useful purposes, in fact the stars were to the people, who lived two or three thonsand years ago, what our almanacs are to us at the present day, for by means of the stars they knew when it was a certain time of the year, whether seed time, or harvest, or the beginning of the seasons, &c., all of which would be valuable for many purposes besides agricultural. They watched when certain conspicious stars rose, or set, immediately before, or after, the sun (called the heliacal rising of a star), which, only taking place once each year, would let them know how far the seasons had advanced. The people in Egypt, for instance, knew when the Nile would likely overflow its banks, by the star Sirius rising heliacally and becoming visible in the early morning. By the stars the Phoenicians (who are supposed to have been the originators of nautical astronomy) knew in what direction to steer their ships at night by watching, the Little Bear, which they knew to be always near the North—as Aratus, referring to this constellation, informs us—

"Observing this, Phoenicians plough the main."

The use of the Pole Star (a bright star in the tip of the Little Bear's tail) in navigation is said to have been introduced into Greece by Thales, who derived his knowledge from the Phoenicians; it has ever since been used by sailors for finding their position on the trackless ocean.

In modern astronomy the old constellation names do not hold so important a postion as they once did.' Still they form a convenient method for distinguishing the stars, though to the practical astronomer the number of a star in some important catalogue (such as "Struve 3521") is all that is required to identify it. However, to those who only want to be able to distinguish the stars, the old constellations and the individual names of stars, have a far greater interest, and are thus more easily remembered than a star known only by number; and it is highly probable that the constellation figures, which have for so many centuries been fixed upon men's minds, will not be dismissed even from exact astronomy for many years to come; for as the fancied figures in the different star-groups had once such a hold upon mankind, and are so often mentioned by ancient poets, so they will not be altogether forgotten even after astronomy has adopted some more improved system of distinguishing the stars than at present exists.

In the light of the wonderful discoveries that have been made in the sidereal heavens since Galileo first turned the telescope to the stars, each star that is seen on a clear night is now looked upon as a sun, and so will be the centre round which other planets revolve; just as our sun, which is also a star, and far from being the most important among its companions, is the centre to its family of worlds circling round it—now which the earth is one of the least—so that

"The radiant orbs
That more than deck, that animate the sky,
Are life-infusing suns of other worlds."

But what may at first seem surprising is the fact that, amidst the all-seeming stillness of the star depths, there is yet going on a continual movement and uproar. Each sun is moving with a fearful velocity, and carrying its family of planets along with it. Some are travelling on their stately course at such a speed that every hour they pass over a space equal to three thousand miles. Our sun is also travelling, and with a great velocity, so that in fact "suns are revolving round suns, and systems round systems." But further, each orb is aglow with fiery energy: it is a storehouse from which bounteous supplies of light and life are continually being given out to the numerous worlds that are kept circling round it by the attraction of its mighty influence. We know in the case of our sun that storms are raging on its surface, in which great masses of intensely heated vapour, thousands of miles in breadth, are rushing onward with dreadful force and at a great velocity—a velocity that is hundreds of times greater than the speed of a cannon ball. We also know of the great masses of glowing matter that are occasionally flung from the sun to a height nearly as great as is half the distance from the earth to the moon. And as these motions and uproars cannot take place without a great noise, there must be incessantly produced on the sun a noise compared to which the loudest crash of thunder, or the roar of the greatest piece of artillery, will be as absolute silence. This, then, being the seeming stillness of our sun, what must be the uproar on a sun exceeding ours one thousand times in volume It will likely be proportionally as great; so that in the awful stillness of the star depths there is going on continually a fearful uproar and tumult, compared to which the greatest noise that we can realize sinks into complete nothingness.

Then in what infinite numbers are the stars scattered throughout the universe and these distrubances going on in each! Each one, is without doubt, working out the purpose of its Creator, and until that purpose shall be fulfilled it will, like some mighty engine, work unceasingly, giving out life, light, and heat to the many worlds that circle round it. Each is the source from which countless forms of life derive their existence and as we know that there is, at least, one planet—probably several—in our solar system that is inhabited with intelligent beings, we are naturally led to the conclusion—it would be unreasonable to suppose otherwise —that those planets circling round other suns—many of which far surpass our own in splendour—are the abode of other intelligences. Again, at what enormous distances are the stars situated from each other; the nearest to us, as at present known, being no less than 20 billions of miles away, a distance that is so great that it cannot be travelled by light (which moves at the velocity of 186 thousand miles each second) in less than three and a half years! But at what a vast distance those stars be that even light itself requires not only 10, 20, or a 100 years, but 10, 20 or 100 thousand years to complete the journey to our earth! We do not see the stars, therefore as they are now, of their present existence we have not the slighest knowledge, but as they were 19, 20, or 100 thousand years ago. They may have ceased to exist for many years, because we will not know till the ray of light bearing the information reaches us; it may be on the journey to tell us of a conflagration that has taken place on a star 20 years ago, or that a system of worlds has been destroyed. Seeing, therefore, that light takes such an interval of time to journey from one star to another, we may perceive, though dimly, how vast the dimensions of this visible universe must be.

And this is only the known universe! How great is the unknown? For the many millions of stars which are revealed to us by means of the most powerful telescope, are only as "a drop in the bucket" to the infinite number which exists throughout the boundless universe! In fact, all the stars which are seen in the heavens, together with our Sun, form a part only of one vast and complicated aggregation or orbs, of which there are, in all probabilitiy, an endless number scattered throughout the depths of infinite space. What, then, must we think when we thus find, not only myriads of stars, but myriads of star-clusters, each containing millions of millions of suns—suns, which, perhaps, are far more resplendent, and which rule over hundreds of worlds more spacious than our own.

The mind cannot realize the meaning and infinite significance of such a wondrous scene. And further, when we reflect that, very probably, each of these worlds revolving round other suns, will, at some period or another of their existence, be the abode of intelligent life, a deeper meaning is given to the words of the inspired Psalmist,—"When I consider Thy heavens, the work of Thy fingers, the moon and the stars, which Thou hast ordained; what is man, that Thou art mindful of him and the son of man, that Thou visitest him?"

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AMATEUR'S FORUM

By IRVING L. MEYER, M. S.

July, 1953

THE SUN: moves from Gemini into Cancer. The earth is in aphelion (farthest from the Sun) on the 5th at 94.4 million miles.

There is a partial eclipse of the Sun on the 10th, visibility of which is limited mainly to the Arctic, including large portions of northern Greenland, eastern Alaska, northwest Canada, and a small area in the United States in the states of Washington, Idaho, and Montana. At the point of greatest eclipse on the earth's surface, only 20% of the Sun's diameter will be obscured.

THE MOON: is at apogee (farthest from the earth) on the 16th at a distance of 252,000 miles, and is at perigee (closest to the earth) on the 28th at a distance of 225,000 miles.

The Moon's Phases (E. S. T.):

Last quarter	July 3 at 5:03 PM
New Moon	10 at 9:28 PM
First quarter	18 at 11:47 PM
Full Moon	26 at 7:20 AM

There is a total eclipse of the Moon on the 26th, visible principally over the Pacific and Indian Ocean areas, Asia, Australia, and Antarctica. The beginning is visible in the western portions of North and South America.

Circumstances of the Eclipse (E. S. T.):

Moon enters penumbra	July 26 at 4:36 AM
Moon enters umbra	26 at 5:33 AM
Total eclipse begins	26 at 6:30 AM
Middle of eclipse	26 at 7:21 AM
Total eclipse ends	26 at 8:11 AM
Moon leaves umbra	26 at 9:09 AM
Moon leaves penumbra	26 at 10:05 AM

The magnitude of the eclipse is 1.869, where the Moon's diameter is taken as 1.0. This accounts for the long duration of totality.

MERCURY: is in Cancer all month, commencing as an evening star, but becoming a morning star as of the date of inferior conjunction with the sun—the 25th. This elusive planet can be spotted for the first few days of the month, low in the west shortly after sunset, in the twilight zone. It is a first magnitude object, appearing in the telescope as a rather thin crescent. Distance the 21st (minimum) is 54 million miles.

VENUS: crosses Taurus during the month, in the morning sky. It is an extremely brilliant object, well placed for observation in the late morning sky. During the month increased distance (from 72 to 93 million miles) has reduced brightness from -3.9 to -3.6 magnitude, and apparent diameter from 22″ to 17″. In the telescope Venus appears slightly gibbous.

MARS: is in conjunction with the Sun on the 8th, and thereafter will appear in the morning sky. Maximum geocentric distance, the 25th, is 245 million miles. Moving from Gemini into Cancer, it is too close to the Sun all month to be observable. On the 12th, Mars is in conjunction with Uranus, and only a half degree north of that planet. If this conjunction could be observed, the telescope would reveal two objects of exactly the same apparent diameter (3½″), but four magnitudes different in brightness!

JUPITER: in Taurus, can be seen in the morning sky before sunrise. Though not yet well placed for observation, it is well worth watching, for this month there is another of the famous Venus-Jupiter conjunctions. Conjunction takes place on the 22nd with Jupiter north 1° 55′. Jupiter wll be at magnitude -1.6, so Venus will appear considerably the brighter. Jupiter's distance the 15th is 541 million miles.

SATURN: is well placed for observation in Virgo, about 5° north of Spica. It sets around midnight, giving ample time for telescopic or naked-eye study. Small telescopes will reveal the rings, as well as the brightest satellite, Titan. On the 15th, distance is 901 million miles, magnitude is 1.0, and the apparent diameter of the ring system is 39″.

URANUS: is in Gemini all month, too close to the Sun to be observable. It is in conjunction with the Sun the 11th, and is also at its greatest geocentric distance, 1834 million miles.

Orbits and Heliocentric Movements of the Planets for July, 1953

NEPTUNE: an 8th magnitude planet in Virgo, between Saturn and Spica, is still well observable. It cannot be seen with the naked eye, but can be spotted in good binoculars; a power of 100 diameters on a sizeable telescope, will reveal its disc. It is in conjunction with Saturn again on the 10th, and Neptune is south only 53′. Distance the 15th is 2816 million miles.

AMATEUR'S FORUM

August, 1953

THE SUN: leaves Cancer and enters Leo as it picks up speed toward the southern hemisphere. Distance decreases from 94.3 to 93.8 million miles.

There will be a partial eclipse of the Sun on the 9th, invisible in the United States, but visible over most of Argentina and Chile, and portions of the south Pacific and Atlantic Oceans, and Antarctica. At maximum, 37% of the Sun's diameter will be eclipsed.

THE MOON: is farthest the 13th (252,000 miles) and closest the 25th (223,000 miles).

The Moon's phases (E. S. T.):

Last quarter	August 1 at 10:16 PM
New Moon	9 at 11:10 AM
First quarter	17 at 3:08 PM
Full Moon	24 at 3:21 PM
Last quarter	31 at 5:46 AM

MERCURY: is in the morning sky, and moves from Cancer into Leo. It reaches greatest elongation west of the Sun, 18° 49′, on the 13th, so the planet will be observable for about a week around this date. It will be visible in the morning twilight, low in the east, as a bright star (magnitude 0.1). In the telescope it will appear much like the half-moon. Distance increases from 60 million miles the 1st to 121 million miles the 31st. On the 23rd there will be a very close conjunction with Mars, but both planets will be pretty difficult at that time by reason of proximity to the Sun. Circle-equipped telescopes should show up this conjunction in daylight.

VENUS: moves from Taurus through Gemini into Cancer, in the morning sky. Well placed for observation, this planet shines as the brightest starlike object in the heavens. Distance is increasing —from 94 million miles the 1st to 113 million miles the 31st.

MARS: in the morning sky, moves through Cancer to the Leo border. It is too close to the Sun, and too remote from the earth for worthwhile observation. Distance the 1st is 245 million miles; the 31st is 241 million miles.

JUPITER: in the morning sky in Taurus is now pretty well placed for observation, as its position improves daily. It still rises after midnight, to become a bright companion to Venus in the late morning sky. Distance the 15th is 508 million miles.

SATURN: is in Virgo, setting a few hours after the Sun. It is no longer particularly well placed for observation. Distance the 15th is 947 million miles.

URANUS: in Gemini in the morning sky, is also too close to the Sun for worthwhile observation. Distance the 15th is 1819 million miles.

NEPTUNE: in Virgo, near Saturn, is also leaving the evening scene. Although it can be located as the twilight disappears, it is, nevertheless, an inconspicuous object of the 8th magnitude. Distance the 15th is 2862 million miles.

Orbits and Heliocentric Movements of the Planets for Aug., 1953

NOTE: The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month, are given for Mercury, Venus and Mars. The arrow indicates the last day of the month. Jupiter, Saturn, Uranus and Neptune are shown in the mean position for the current month.

PLANETARY CONFIGURATIONS

Eastern Standard Time

July 1953

July	3— 7:	AM	Neptune stationary in right ascension
July	5— 1:	PM	Earth in aphelion
July	7— 7:44	AM	Conjunction, Venus and Moon; Venus south 7° 45′
July	8— 6:15	AM	Conjunction, Jupiter and Moon; Jupiter south 4° 36′
July	8— 4:	PM	Conjunction, Mars and Sun
July	9—11:	AM	Mercury in aphelion
July	10— 5:	PM	Mercury stationary in Right Ascension
July	10		Partial eclipse of the Sun
July	10— 7:	PM	Conjunction, Saturn and Neptune; Saturn north 0° 53′
July	10— 8:01	PM	Conjunction, Mars and Moon; Mars south 0° 27′
July	10— 9:43	PM	Conjunction, Uranus and Moon; Uranus south 0° 55′
July	11— 4:	AM	Conjunction, Uranus and Sun
July	12— 6:	AM	Venus greatest heliocentric latitude south
July	12— 8:	AM	Conjunction, Mars and Uranus; Mars north 0° 33′
July	12—10:15	AM	Conjunction, Mercury and Moon; Mercury south 2° 48′
July	13— 9:	AM	Quadrature, Saturn and Sun
July	13— 4:	PM	Quadrature, Neptune and Sun
July	18— 7:18	PM	Conjunction, Neptune and Moon; Neptune north 7° 26′
July	18— 7:43	PM	Conjunction, Saturn and Sun; Saturn north 8° 17′
July	22— 5:	PM	Conjunction, Venus and Jupiter; Venus south 1° 55′
July	25— 4:	AM	Inferior conjunction, Mercury and Sun; Mercury south 4° 58′
July	26		Total eclipse of the Moon
July	28—12:00	AM	Conjunction, Mercury and Mars; Mercury south 6° 1′
July	29— 7:	PM	Mercury greatest heliocentric latitude south

PLANETARY CONFIGURATIONS

Eastern Standard Time

August 1953

Aug.	4— 6:	AM	Mercury stationary in Right Ascension
Aug.	4— 9:40	PM	Conjunction, Jupiter and Moon; Jupiter south 4° 16′
Aug.	5— 9:10	PM	Conjunction, Venus and Moon, Venus south 4° 33′
Aug.	7— 7:26	AM	Conjunction, Uranus and Moon; Uranus south 0° 47′
Aug.	7— 9:16	PM	Conjunction, Mercury and Moon; Mercury south 3° 14′
Aug.	8— 3:39	PM	Conjunction, Mars and Moon; Mars north 1° 28′
Aug.	9		Partial eclipse of the Sun
Aug.	13— 4:	AM	Mercury greatest elongation west, 18° 49′
Aug.	15— 3:25	AM	Conjunction, Neptune and Moon; Neptune north 7° 23′
Aug.	15— 6:13	AM	Conjunction, Saturn and Moon; Saturn north 8° 9′
Aug.	15— 8:	PM	Conjunction, Pluto and Sun
Aug.	17— 8:	PM	Mercury in ascending Node
Aug.	22—11:	AM	Mercury in perihelion
Aug.	22—12:	PM	Conjunction, Venus and Uranus; Venus south 1° 19′
Aug.	23— 9:	AM	Conjunction, Mercury and Mars; Mercury south 0° 6′

Sweeping in the August Sky

Last month we picked out the visible constellations by means of the North Star and the Dippers. Since then a few more have arrived. Saggittarius has replaced Scorpio down on the meridian. Its tangled collection of second and third magnitude stars is rather shapeless but quite unmistakeable because of its brilliancy. Saggitta's tiny arrow may be found on a good night by letting the eye run between Altair and Albireo.

There is no other marked asterism in the vicinity, saving compact Delphinus, which lies just to the east. In the northwest there rises the colossal diamond that is the tilted "Square of Pegasus" and further north there runs parallel to the horizon, and low, the "string of lanterns" that marks Andromeda and is continued by Alpha Persei. In the southeast lies the confused region in which is traced Capricorn and part of Aquarius. But the most welcome newcomer is the Milky Way, which is now high in the east and furnishes a glorious spectacle for those out-of-doors on warm summer evenings.

Let us this month take an opera glass—one magnifying only twice will do if it has a sharp focus—and sweep along the glorious road of the Milky Way. Starting low in the northeast, we come to the familiar "W" of Cassei-oppia. The number of faint stars is not so great here, but one of them rather spoils the outline of the figure. There is a pair between it and the middle of the star of the "W" and the region around the latter is rather pretty. Counting from east to west, the first star is yellowish, the second (a variable described elsewhere in this issue) may be either yellow or reddish, and the fourth is bluish.

Moving up the galaxy we come to the rectangle of Cepheus, where the faint stars abound. The lower eastern corner of the rectangle is marked, not by one star but by a sort of fan of third and fourth magnitude stars, one of which is markedly tinted with red. The central star of the group is the famous delta Cephei, prototype of the Cepheid variables. It was just two degrees east of this little grou that Nova Lacertae, 1936 appeared. There is a "Coal Sack in the Milky Way at this point. Other red stars in Cepheus are iota, the lower western corner of the rectangle, and mu, the famous "Garnet Star of Herschel. Mu is just east of the eastern side of the rectangle but with out a chart it can be picked out of the confusion of faint twinklers only by its color. It is an irregular variable which seems to have a period of several years.

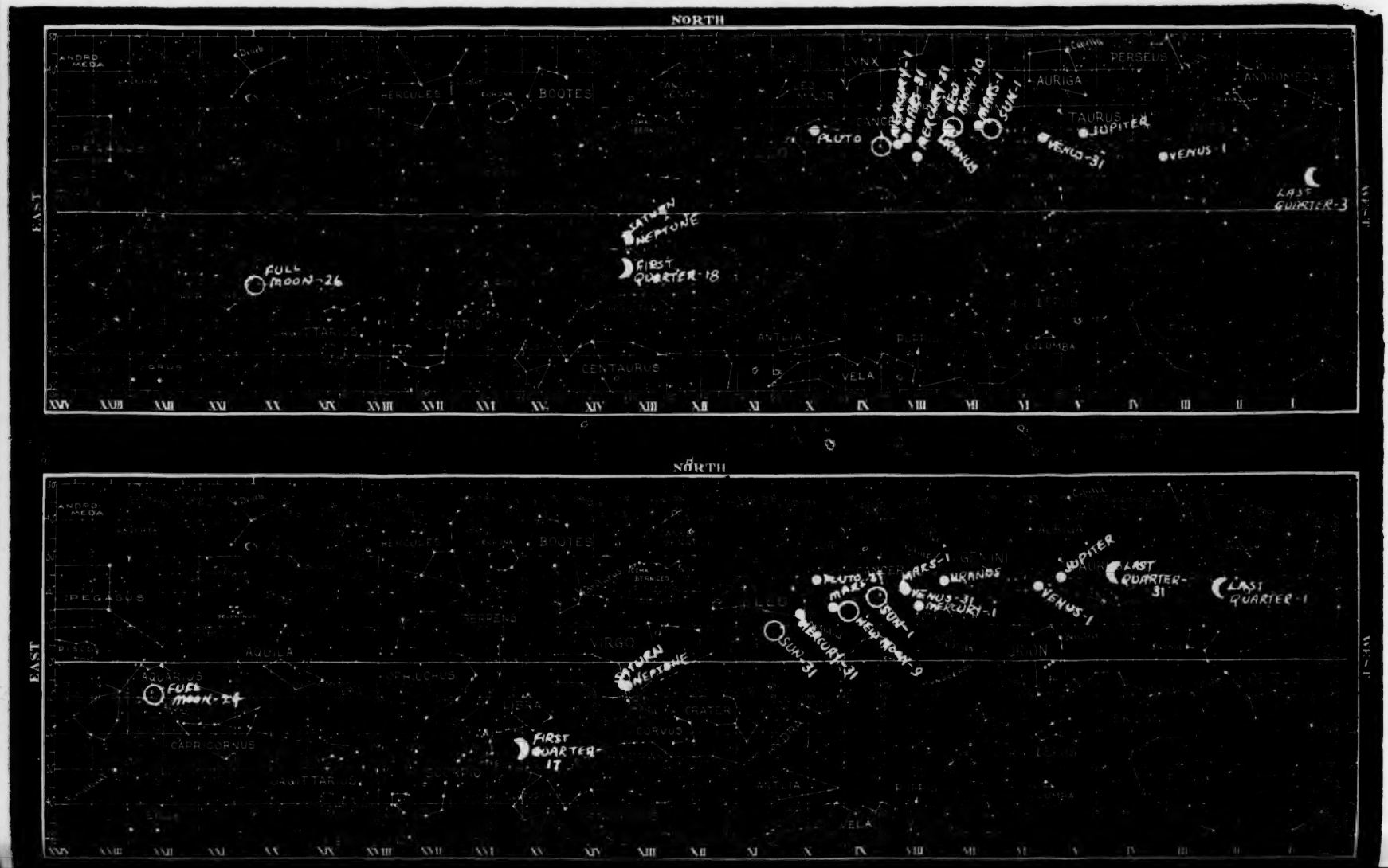
We move quite a distance along the Milky Way before we come to Cygnus, and by now the faint stars have become innumerable. Here we see several "Coal Sacks" and the beginning of the long rift in the Milky Way. On a fine night both these phenomena are very striking and mysterious. The most famous object here, 61, lies in such a complicated field that it is impossible to direct the observor to it without the aid of a chart. But there are many fine pairs and colored stars waiting the patient explorer of this region. Halfway between Deneb and the western end of the cross-arm lies the fairly isolated fourth magnitude pair, Omicron one and Omicron two. The latter, which is the northernmost, may be split easily. Olcott says that its components are orange and blue, though it probably takes a strong glass to bring out the colors.

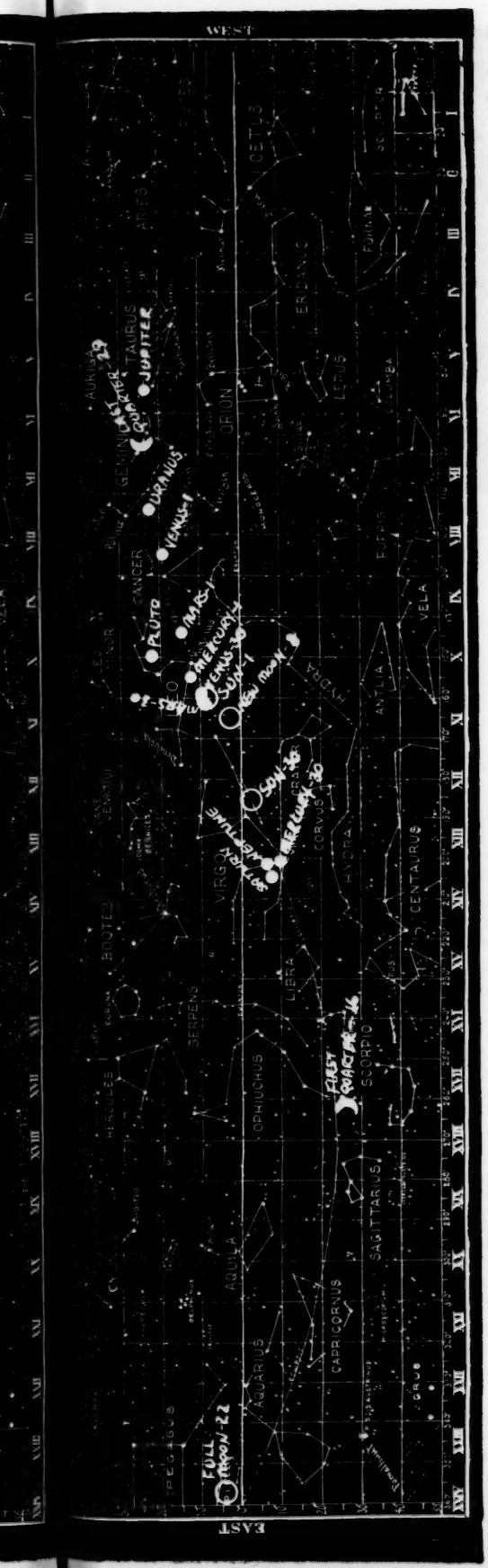
Between Cygnus and Aquila lies one of the most rich faint regions in the sky. The first group in it is the difficult Vulpecula et Anser—the Fox and the Goose—which is marked by two pretty streams of stars. It is

(Continued on Page Seven)

A MERCATOR PROJECTION OF THE STAR FIELD FOR 50 DEGREES NORTH AND 65 SOUTH OF THE EQUATOR

The Star Field makes an apparent complete revolution westward every 24 hours, hence the hourly division from I to XXIV, but this has no relation to the time that any portion of the map is in view
Practical as a Star, Constellation and Planet Finder for the current months—April-May-June, 1953—Anywhere in the World.
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases





Nov. 5 Oct. 22 Oct. 5 Sept. 20 Sept. 5 Aug. 20 Aug. 5 July 20 July 5 June 20 June 5 May 20 May 5 Apr. 20 Apr. 5 Mar. 20 Mar. 5 Feb. 18 Feb. 2 Jan. 20 Jan. 5 Dec. 20 Dec. 5 Nov. 20

THE DATE BELOW EACH NUMERAL WILL SHOW WHEN THAT SECTION OF THE MAP WILL BE ON THE MERIDIAN—DUE SOUTH—AT 9 P. M. OR AN HOUR EARLIER FOR EACH NUMERAL WEST OF THIS DATE AND AN HOUR LATER FOR EACH NUMERAL EAST.

not on the chart but must be found by sweeping between Saggita and Cygnus. Serviss says that nearby "about halfway from Albireo to the two stars zeta and eta in Aquila (a bright pair marking the tail of the Eagle that lie over three degrees above and two degrees west of the top star in the "Family") is a very curious little group, consisting of six or seen stars in a straight row, with a garland of other stars hanging from the center."

As Olcott remarks Saggita is "interesting because it really looks like an arrow." It is only sketchily indicated on the chart; there are actually four stars in the outline of the figure, alpha and beta, to the west, marking the feathered end. It is a striking little figure, though it contains no bright stars, and it was formed as far back as Aratos' day. Greeks, Romans, Turks, Hebrews, and Arabians have all figured it as an arrow. Delta, the middle star of the comparatively brilliant four, is accompanied by sixth magnitude zeta.

Aquila, itself, has very little to offer. The star just above Altair is a marked red. To the east of third magnitude theta (the easternmost star shown on the chart) curves the asterism of Antinous, which was probably the second one invented after the Greeks had fixed the "classical" forms. (Coma Berenices was earlier.) About two degrees west of and a little above theta lies eta, a Cepheid variable. (Do not try to use the chart in this region.) Sweeping further west and down to the height of theta again we find the faint iota, and four degrees further down lie third magnitude lambda and its fainter neighbor. (The length of the "Family of Aquila" may be taken as three degrees.) Just west of this pair, in a sort of pool in the Milky Way, is the delicate circlet of faint white and bluish stars that marks Scutum Sobieskii —the shield of John Sobieski, third and noblest king of Poland. The chief beauty of the group is the Milky Way, itself, which widens and runs rich as if to form a fit mounting for the shield. Here Herschel counted 331,000 stars in a field of five degrees width — over 10,000 a square degree. This star cloud in Scutum is the first of an increasingly rich series that runs down to the southern horizon. Observers in northern latitudes cannot get as good a view of the Saggittarius star clouds as of that in Scutum. On the finest of nights, however, it is well worth a long tramp to sweep slowly down each branch of the Milky Way to a clear southern horizon.

LET THERE BE LIGHT

"Let there be light," the great, eternal God,
In words of lightning wrote his matchless name,
Touched Epsilon Aurigae with his rod,
And twice a billion million miles awoke to flame;
Death fled, Life came across creation's bars,
In planet families of the countless stars.
"Let there be light," as tender as a kiss
From mother lips, their tempered light is shed;
By such sweet luster, very far from this,
Mignt angels woo a fretful child to bed.
Oh, rapturous thought that some day we shall see
Those peopled reaches of our home to be.
"Let there be light," below unmeasured weight,
Beneath the sea's uncounted atmospheres,
Is life that claims his notice, small and great,
To each and all his candle-light appears,
To all comes home through Nature's aching night,
The loving voice of God, "Let there be light."
"Let there be light," the galaxies of space,
Came into being, answering his call,
The unseen atom flamed and showed his face,
Who plans the great and infinitely small;
No hope to compass with this thought of mine,
The joy unmeasured, where his camp-fires shine.

THE STAR OF THE MONTH—ANTARES

The red stars are by far the most striking in the sky and for milleniums Antares has been famous as *the* red star. In the oldest records of the Euphratian civilization we find Antares referred to as "The Vermilion Star" and the "Hero-King." Allen adds that the star was then identified with the god of lightning, and that its name had already been associated with that of Mars. (Astrologically, Scorpio has always been the House of Mars.) He also says that the name "Great Fire" which was applied to Scorpio in the day of Confucious was given to Antares in primeval times. Egyptian temples to the goddess Selk't dating from 3500 B.C. were oriented to Antares, which later became the sign of Isis. So was the oldest known Greek temple (dated at 1760 B.C.).

The conspicuous arrangement of the stars of upper Scorpio has attracted widespread attention. Antares and the stars sigma and tau on either side of it served as stations in the lunar zodiacs of Chinese, Hindus and Persians. Allen says the Hindus saw a pendant 'Ear-Jewel' there and that the Chinese pictured in upper Scorpio "The Emperor's Council Hall" in which Antares, as Emperor, expounds the principles of government to his sons and courtiers.

The more recent names for the star include the Greek "Antares" (which may mean "similiar to" and "equivalent of" as well as the neat and oft-quoted "rival of" Mars), the Arabic "Heart of the Scorpion" (the "Kalb al Akrab" which degenerated into such weird forms as "Calbalatrab" and "Al Cantub") and the Roman "Cor Scorpii." This is probably the only name of an individual star which is purely Greek, with neither early nor Arabic influences. The Greeks managed to hit upon a "mot-juste" that has outlived the test and withstood corruption.

Out of the deserts of central Asia comes the truly romantic name, "The Grave Digger of Caravans." Olcott explains rather cryptically that "as long as it (Antares) rose with Orion in the morning, robbers and death followed the stations."

Although it is sixteenth in the sky (magnitude 1.22) and equalled by Spica, Antares gains much apparent brilliancy by its redness. (Mrs. Martin claims that on poor nights its "red light shining through the heavy atmosphere is so diffused that it gives a rosy effect to the sky for a considerable distance around the star.") Photographically, Antares is just a bit brighter than sigma and tau. A four or five inch glass shows an emerald green companion between 3 and 3.5 seconds away and 270 degrees east of north, that is, due west, of the primary. the two are probably a binary system, though their relative positions have not changed appreciably since discovery, because they are moving together in space. Serviss calls this double "the finest in the sky" and adds that during occultations "the little green star has been seen emerging from the moon ahead of its ruddy companion." Antares itself is suspected of being a spectroscopic binary. Miss Dorothy N. Davis states in an "Astrophysical Journal" that though its velocity along the line of sight varies as much as 6 kilometers per second in an irregular period averaging 7.4 and the strength of the hydrogen lines in its spectrum seems to indicate that they are the combined effect of two stars it is still possible that Antares is not double, but is only displaying some unusual condition.

It is a giant star with a diameter 480 times that of the sun and twice that of the earth's orbit. Though cool, giving off only 1/80th as much light per square mile as the sun, its total luminosity is about 3000 times the sun's. Its temperature lies between 2400 and 2800 degrees centigrade, and is slightly less than that of Arcturus. According to Schlesinger's recent catalogue it is 325 light years away. Russell, Dugan, and Stewart give its tangential velocity as 17 kilometers per second and its radial velocity as 3 kilometers per second toward the sun, which would mean that the star is travelling through space at about 10.7 miles per second. Antares is a member of the Scorpio-Centaurus open cluster, which includes sigma and tau and the head of Scorpio, Spica, beta Centauri, and some of the stars in the Soutehern Cross, all of which are traveling together through space.

Orbits and Heliocentric Movements of the Planets for Sept., 1953

AMATEUR'S FORUM

By IRVING L. MEYER, M. S.

September, 1953

THE SUN: crosses the equator and enters the southern hemisphere on the 23rd. It travels from Leo into Virgo. Distance decreases from 93.8 to 93.0 million miles.

THE MOON: is at apogee the 9th at 253,000 miles, and is at perigee the 22nd at 222,000 miles.

The Moon's Phases (E. S. T.):

New Moon	September 8 at	2:47 AM
First quarter	16 at	4:49 AM
Full Moon	22 at	11:15 PM
Last quarter	29 at	4:51 PM

MERCURY: moves from Leo into Virgo, and is close to Neptune and Saturn at the end of the month. It is in superior conjunction with the Sun the 7th, entering the evening sky, but is too close to the Sun all month to be observable. Maximum geocentric distance, 129 million miles, occurs the 14th.

VENUS: in the morning sky, moves from Cancer into Leo. Still easily observable, it is slowly disappearing into the area near the Sun; by the end of the year it will be too close for observation. Distance the 1st is 113 million miles; the 30th is 130 million miles.

MARS: in the morning sky in Leo all month, is too close to the Sun for observation. Distance is now decreasing — from 241 million miles the 1st to 231 million miles the 30th.

JUPITER: now rises around midnight from a point in Taurus. It is pretty well placed for observation; opera glasses will show the four bright moons and the disc, while moderate power on a telescope will reveal the flattening of the disc and the cloud belts. On the 1st, equatorial diameter is 38" and magnitude -1.8; on the 30th, equatorial diameter is 41" and magnitude -2.0. Distance the 15th is 466 million miles.

SATURN: is in the evening sky in Virgo, setting shortly after the Sun. Not well placed for observation. Distance the 15th is 982 million miles.

URANUS: in Gemini, in the morning sky, rises after midnight, but is pretty well placed for observation. At magnitude 6, it is just visible to the unaided eye on a moonless night. Distance the 15th is 1784 million miles.

NEPTUNE: also in Virgo in the evening sky, sets to closely after the Sun to be observable. Distance the 15th is 2896 million miles.

PLANETARY CONFIGURATIONS

Eastern Standard Time

September 1953

Sept.	1	10:50 AM	Conjunction, Jupiter and Moon; Jupiter south 3° 53′
Sept.	1	5: PM	Mercury greatest heliocentric latitude north
Sept.	3	3:52 PM	Conjunction, Uranus and Moon; Uranus south 0° 35′
Sept.	4	10:23 PM	Conjunction, Venus and Moon; Venus north 0° 19′
Sept.	6	11:51 AM	Conjunction, Mars and Moon; Mars north 3° 25′
Sept.	6	1: PM	Venus in ascending node
Sept.	7	4: AM	Superior conjunction, Mercury and Sun; Mercury north 1° 40′
Sept.	8	10:17 AM	Conjunction, Mercury and Moon; Mercury north 5° 48′
Sept.	11	11:08 AM	Conjunction, Neptune and Moon; Neptune north 7° 15′
Sept.	11	5:25 PM	Conjunction, Saturn and Moon; Saturn north 7° 56′
Sept.	18	8: AM	Quadrature, Jupiter and Sun
Sept.	19	8: AM	Mars greatest heliocentric latitude north
Sept.	23	3:07 AM	Sun enters Libra; Equinox
Sept.	25	4: AM	Mercury in descending node
Sept.	28	9:56 PM	Conjunction, Jupiter and Moon; Jupiter south 3° 30′
Sept.	30	9: AM	Conjunction, Mercury and Neptune, Mercury south 2° 26′
Sept.	30	11:45 PM	Conjunction, Uranus and Moon; Uranus south 0° 17′

THE STAR OF THE MONTH – ALTAIR

Altair is not very conspicuous in its own right but it compels attention because of the stars supporting it on either side. This row of three brilliants, of which Altair is the center, was figured as an eagle long before the present constellation of Aquila was formed. Our name for Altair comes from the Arabic name for the trio: "the flying eagle" or "al nasr al tair." (In the past it has been corrupted into Atthair, Attair, Alcair, and even Alcar, but Altair is now universal.) As early as eight or nine hundred B.C. the star was known to the Greeks as an eagle. What little evidence there is seems to indicate that a thousand years before that the star was identified with a powerful bird by the peoples who lived along the Euphrates. The trio of stars figured in the Hindu lunar zodiac as "the Ear" but they were also the Three Footsteps with which the god Vishnu strode through the heavens. Last year we mentioned the Oriental myth cycle built about the banished lovers, Vega and Altair. Allen supplies another detail, however. It seems that the reason for the prince's banishment was the investment of his royal father's money in a scheme to tap the Milky Way. The idea was to divert some of the fluid to nourish the more distant stars! We now know the trio, less picturesquely, as "the Family of Aquila" and 't'he Shaft of Altair."

Altair is the twelfth brightest star in the sky, and the eighth brightest visible in northern latitudes. It is the most typical first magnitude star, saving southern Acrux. (Altair's magnitude of 0.89 is as much brighter than1.00 as Aldebaran's 1.11 is fainter. Aldebaran's red color makes it a deceptive yardstick, however. Acrux is of magnitude 1.02, almost exactly first.) There is some evidence that its light may not be stable, since Ptolemy made it second magnitude, and Gould suspected it of variability. Modern measures seem to agree fairly well, however. Its color is variously given as white and pale yellow, but few naked eye observors see any tint in it. It has a tenth magnitude companion at a distance of 2½ minutes, none closer, and does not show any signs of spectroscopic duplicity.

Physically, Altair is an early star (spectrum A5, a Sirian type) on the main sequence of the spectrum-luminosity diagram. Its total luminosity is nine times that of the sun, while its intrinsic brightness per square foot is thrice that of the sun. From these figures we find its diameter to be about 3/2 that of our sun. Altair's mass and density are estimated at 1.1 times those of the sun, and its surface temperature is put at about 8,500 degrees Centigrade. The star is16.0 light years away and approaching at 12.5 miles per second. Its speed across the sky is 9.3 miles a second. Because the star is so near, this gives it a large proper motion—0.659" a year or over a minute of arc each century.

Altair and its companions may be seen rising only eight degrees north of true east in the early evenings of mid-June and setting in the west in mid-December. They reach the meridian at nine o'clock on September first.

Some Summer Star Colors

The striking colors of the bright stars have given pleasure to most of us but on a clear night the intensely colored fainter stars can be more satisfying. The fainter red stars, gamma Aquilae, gamma Draconis, and iota and mu Cephei, are especially striking on a fine night. The summer replaces its loss of golden Capella with the light of Arcturus at the zenith and the maximum of alpha Casseioppiae. The rarer colors, the lilac and lemon, the topaz and emerald, of the telescopist do not appear in the field glass, but there is still the yellow-green of beta Librae. Those who live in northern United States must catch this star on an exceptional night. Once caught, its light is unforgettable.

There are many lesser gems of course. Variable alpha Herculis is orange, eta Bootis, gamma Delphinis, and gamma Leonis are yellow. The blue stars are innumerable. (Most people see nearly all stars as bluish.) But the summer can offer no approach to the contrasted red and blue of winter's lambda and gamma Tauri.

Some people see no color in the sky; others see colors everywhere. Those who do have a good eye for the tints of faint stars can feel the proprietary thrill of finding a new and charming star friend by exploring for colors with a sharp-focusing field glass on the better nights this summer.

The Star of the Month – Vega

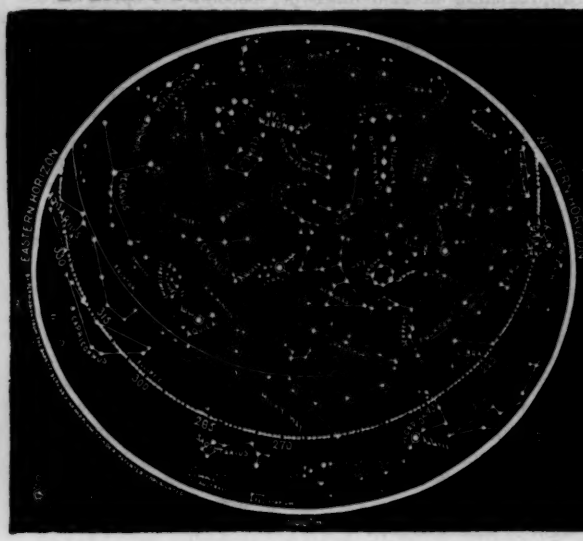
Just as our northern sky is dominated all winter long by the gold of Capella, so is the late summer sky dominated by the sapphire of Vega. As dusk settles the first stars out are Arcturus and the striking "Summer Triangle" of Vega, Daneb, and Altair. But as the fainter stars appear Deneb loses its individuality in Cygnus' riot of light and southern Altair blends with its "Family" and one is more attracted by the blue arc-light Vega.

The tiny triangle of which Vega is the apex has attracted attention in many lands. The arabs pictured it as a "falling eagle," wings folded, in contrast with Altair's "Family" which was a "flying eagle", wings spread. The Arabian astronomer Ulugh Begh called it a "falling vulture". The figure of a bird is very old, for Hewitt cites the Egyptian "Vulture Star" for Vega and Olcott says that the triangle figured as a bird in the ancient Euphratean astronomics. Allen says that "the Hindus figured it as a 'Triangle' or as the three-cornered nut of the aquatic plant Cringata" and that these same stars were the twentieth station, called "Vicorious" in the Hindu lunar zodiac. Gore cites the Arabic "al-atsafi" as "the trivet."

The classical cycle of myths about the lyre is matched by an Oriental cycle about Vega, itself. Chinese, Japanese, and Koreans all have stories about the unfortunate lovers, Vega and Altair. One Chinese version (quoted by Proctor) says that the pair were happily married till the death of Hakuyo whose spirit floated up on a magpie to become Vega. When her husband died a crow carried him up on the wrong side of the river in which the Master of the Heavens bathed daily (the Milky Way). Once a year the Master leaves to hear the preaching of the laws of Buddha and the lovers may steal together

(Continued on Page Ten)

EVENING SKY MAP FOR AUGUST, 1953



AT 9:00 P. M., AUG. 1; 8:00 P. M., AUG. 15; 7:00 P. M., AUG. 31.

EVENING SKY MAP FOR SEPTEMBER, 1953

AT 9:00 P. M., SEPT. 1; 8:00 P.M., SEPT. 15; 7:00 P. M., SEPT. 30.

This Map is arranged for Latitude 40, South, but is practical for ten or fifteen degrees South or North of this latitude.

The Star of the Month — Vega

(Continued from Page Nine)

over a bridge of crows and magpies. Korean children are said to stone magpies seen on that day because they must be neglecting their job. The lovers are usually "the Spinning Damsel" and "the Cow Herdsman". Allen says that "the Damsel" was the triangle rather than Vega, alone, and Olcott states that "the Cowherd" was represented by the "Family". He cites a more romantic version in which an angry father banished the young lovers with the stipulation that they could see each other once a year if they could contrive to get across the river. They are aided in this by the magpies who form a living bridge for them. According to Lafcadio Hearn this is the basis for the Japanese festial "Tanabata" and on that night the stars "burn five colors". Rain on Tanabata night is a "rain of tears" because it will wash out the magpie bridge.

Vega was named in very ancient times, possibly as far as 1200 B.C., when it was pole-star. Brown quotes the Akkadian "Life of Heaven" and Assyrian "Judge of Heaven" as dating from that time. The Greeks called the star "Lyra" with the constellation as did many Roman and mediaeval writers. Pliny used "Fidicula" form "fidula—a small stringed instrument". Our name "Vega" (which Allen gives as "Wega, less correctly Vega") is from the Arabic and first appears in the Alfonsine Tables. (Gore gives "al-nasr-al-vaki" as a translation of Arabic for "falling eagle". Allen says the Arabic was "Waki" but does not give its meaning.)

Vega (magnitude 0.14) is the fifth brightest star in the sky. The only brighter objects in northern latitudes are Sirius and Betelgeux at maximum. It was the first star to be photographed. It is 27 light years away and 53 times as bright as the sun, though its mass is but 3 times the sun's, and its diameter 2.5 times that of the sun. It has a proper motion of 0.348" a year or 13 kilometers per second and is approaching us at 14 kilometers a second. That means it travels through space at about 11.9 miles a second. A four inch glass will reveal a 10th magnitude companion. Vega is in the evening sky from May to December and culminates at nine P.M. on August 12.

SOME ASTRONOMER

Upon our porch as the departing day
With lengthening shadows chased the light away,
A wee maid sat one balmy eve in June
As katydids with Nature kept in tune.
And from that throne of peace and sweet content
She looked above to see the firmament,
As brilliant stars through darkness of the night
Came with their radiance slowly into sight.
Her brother and her parents joined her there
To gain the blessing of the evening air,
In converse on the topics of the day
They pass these moments from world's cares away.
A lull in talk was broken by this tot
As in her wisdom she expressed this thought:—
"The stars are holes where rain comes through the sky
So birds and flowers can drink when they get dry."

CHARLES COTTINGHAM
Washington, D. C.

"HOW TO USE THE MONTHLY EVENING SKY MAP"

Take a very small electric flashlight, such as can be obtained for fifty cents, take your map out on your lawn any clear evening, be sure that you are protected from street lights as much as possible. Face north, for instance, holding the map in front of your face at an angle of 45 degrees with the word "north" down, then illuminate it with your flashlight. The sky will be black and every figure on the map will be seen with great clearness, then stop off your light, the map disappears and the constellations flash out in the sky exactly as on the map, requiring an exercise of the memory of only half a second; this can be repeated until you have located as many as you wish. Or, if you face N. E. and hold the N. E. corner of the map down, you obtain exactly the same result, or facing any other point of the compass.

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HAVE YOU SEEN THE NEAREST ★ STAR ★ IN THE NORTHERN HEMISPHERE 61 CYGNI?

It is on your meridian at 21 hours 5 minutes Sidereal Time, and 6½ degrees below Deneb which crossed 25 minutes before. It is 6th mag. and beautiful double.

Your Sidereal Time is always the R.A. of your meridian, and when you know where that is your Sidereal Clock and Star List will give you the name of any star crossing it. You can pick out your meridian by checking the R.A. of a familiar star against the Sidereal Clock.

What is the Sidereal Time at Phoenix, Ariz. April 1 1953 at 9 p. m. Mountain Standard Time ?

1.	9 P. M.	21h	00m	00s
2.	Add Long. of M.S.T. Zone 105°/15	7	00	00
3.	Result — Greenwich Time	28	00	00
4.	Subtract Long. Phoenix 112°/15	7	28	00
5.	Result — Phoenix Time	20	32	00
*6.	N. A. p64 Aries G. H. A. 189° 4'/15	12	36	15
7.	Sid. gain in (3) 28h x 9.83 secs. ph.		4	36
8.	Phoenix Sid Time add (5) (6) (7)	9h	12m	51s

*Nautical Almanac (from Washington, D.C.) Aries Greenwich Hour Angle at 0h Greenwich Time, page 64 first column. Conversion of degrees to hours and minutes page 260. Price $2.25.

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*Sidereal Time at Greenwich can be obtained also from the Observer's Handbook published by the Royal Astronomical Society of Canada 3 Willcocks St. Toronto 40¢.

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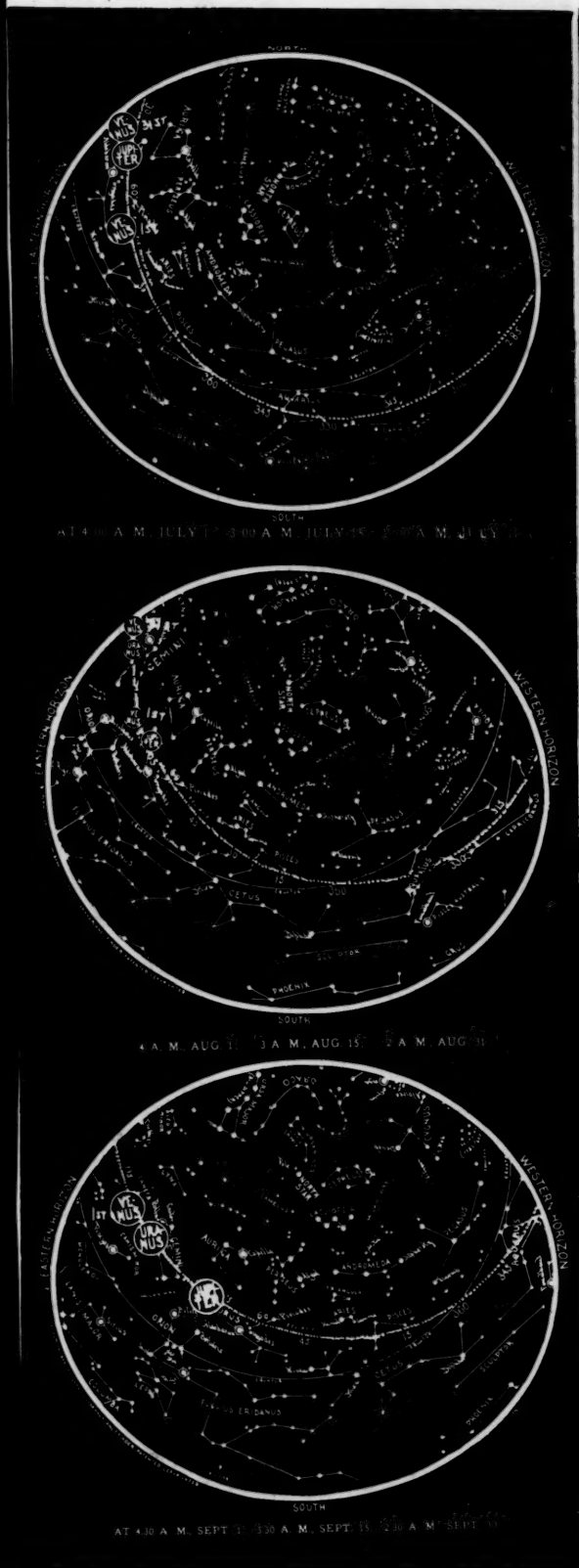

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